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ENGINEERING DATA TRANSMITTAL

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16. KEY

Impact Level (F)	Reason for Transmittal (G)	Disposition (H) & (I)
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(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(J) Name	(M) MSIN	(G) Reason	(H) Disp.
1	1	Cog.Eng. J. A. Seamans	Seamans	4/13/92	N2-04	R. A. Burk	N2-01	4	
1	1	Cog. Mgr. P. C. Miller	PC Miller	4/14/92	N2-04	J. M. Steffen	N1-47	4	
1	2	QA J. A. Parker	J E Parker	4/15/92	N1-71	N. S. Hale	B4-53	4	
1	1	Safety R. W. Passage	R W Passage	15 Apr 92	N2-10	J. D. Williams	R1-48	4	
1	1	Env. E. M. Greager	E M Greager	4/15/92	S6-60	N. R. Dahl	N2-04	4	
1	2	R. W. Oldham	J. J. Lube for	4-15-92	H4-57	J. M. McGee	N1-58	4	
1	2	D. M. Nguyen	DM Nguyen	4/14/92	R1-48	J. E. Hyatt	S0-61	4	

18.	19.	20.	21. DOE APPROVAL (if required)
Seamans 4/17/92 Signature of EDT Originator Date	4/17/92 Authorized Representative Date for Receiving Organization	4-17-92 Cognizant/Project Engineer's Manager Date	Ltr. No. [] Approved [] Approved w/comments [] Disapproved w/comments

SUPPORTING DOCUMENT

1. Total Pages 26		
2. Title 400 Area Secondary Cooling Water Sampling and Analysis Plan	3. Number WHC-SD-FF-PLN-002	4. Rev No. 0
5. Key Words 400 Area, Process Sewer, sampling	6. Author Name: J. A. Seamans Signature Organization/Charge Code 18120/B1257	

7. Abstract

This document presents the 400 Area Process Sewer (also know as Secondary Cooling Water) sampling and analysis plan. The plan describes the sampling methods, location, frequency, analytes, and stream sources. A description of the contributing facilities is also included.

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9. Impact Level 3

10. RELEASE STAMP

400 AREA SECONDARY COOLING WATER SAMPLING AND ANALYSIS PLAN

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LIST OF TABLES

A. INTRODUCTION AND DESCRIPTION OF SAMPLING OBJECTIVES

The 400 Area Secondary Cooling Water is more commonly known as the 400 Area Process Sewer, and this terminology will be used in this document. Both titles describe the same system and are interchangeable.

This plan discusses the stream background and sampling activities specific to the 400 Area effluent. Quality assurance and quality control requirements (QA/QC) are discussed in "Liquid Effluent Sampling Quality Assurance Project Plan" (WHC-EP-0449) (QAPP). The protocol sampling will establish an initial baseline for the 400 Area Process Sewer. After this baseline constituent knowledge is established, the sampling, analysis, and QA/QC requirements may be reduced as appropriate. Changes to this plan will be considered as Class C changes to the "Hanford Federal Facility Agreement and Consent Order," (Washington State Department of Ecology, U. S. Environmental Protection Agency, and U.S. Department of Energy, 1989), also known as the Tri-Party Agreement.

The intent of this plan is to provide a central controlling document for the sampling and analysis activities associated with the 400 Area Process Sewer. This plan will accomplish the following objectives:

1. Provide data to support a conclusive waste designation for the effluent stream.

2. Routinely monitor the stream for flow-rate and constituents as identified in this document, to insure that internal limits are met.

3. Support the regulatory requirements for effluent streams as described in Tri-Party Agreement Consent Order 91NM-177; which requires a WAC 173-240-130, Engineering Report and WAC 173-216, State Waste Discharge Permit.

4. Provide data on chemical and radiological constituents to calculate loading and rate of migration to support the assessment of impact of continued discharge.

5. Provide data to support conclusions of Best Available Technology - Economically Achievable (BAT) or to support treatment system design/modification if needed.

B. FIGURES, TABLES, AND REFERENCES

In this plan, Figures and Tables are placed directly below the first use or at the end of the section of first use. The references in this document address the regulatory drivers and field procedures for sampling and analysis activities at the 400 Area Process Sewer. This will include federal and state regulations, compliance agreements, and company and facility specific procedures. These references encompass the administrative controls for this document.

C. SITE INFORMATION

C.1 400 Area Facilities Description

The 400 Area contains four facilities which contribute to the 400 Area Process Sewer (see Figure 1). These four facilities are not cross-connected by underground piping. The effluent does not flow from one facility to another. The process water flows out from all four facilities through individual pipelines to a sewer main pipe (see Figure 1). This sewer main leaves the 400 Area and discharges the effluent to one of two Percolation Ponds, which will be described at the end of this section.

The four contributing facilities contain 74 potential contributors (i.e., points of entry) to the 400 Area Process Sewer. Table 1 identifies all the entry points, locations, and flow rates. Of the 74 points of entry, nine routine contributors, summarized in Table 2, represent greater than 99% of the total water volume currently discharged into the process sewer. The 74 points of entry and, more specifically, the nine routine points of entry will be discussed further in Section D, "Stream Description". The facility descriptions, and their associated points of entry, are summarized below.

1. **Fuels and Materials Examination Facility (FMEF)** - the FMEF is designed and constructed to be a high security, multi-storied structure with the capability to handle low and high exposure radioactive materials. The original intent was to use FMEF to fabricate and re-process FFTF fuel and experiments. Due to program and funding changes, most of the specialized equipment has never been installed and radioactive material has never been introduced to the facility. The facility is used only for personnel offices. The facility may, in the future, be used for nuclear reactor fuel assembly production and radioisotope power unit production.

   FMEF points of entry - The FMEF contains 63 points of entry to the process sewer. Four are routine and 57 are inactive or have very infrequent use. The points of entry to the 400 Area Process Sewer are innocuous. They would not come into contact with any radioactive materials even if any radioactive material were in the facility. The facility is equipped with a Retention Liquid Waste System (RLWS), which provides effluent hold-up and sampling from areas of the facility were the potential for contamination would be the greatest. With this system, all aqueous waste generated in areas served by the RLWS is collected in one of two 6,000 gallon tanks. The effluent can be sampled for possible radioactivity and verified to meet acceptable discharge limits before being discharged into the process sewer. Currently, the only activity in these areas is routine fire system testing, H&V systems, and electric water coolers (EWC). Due to this low volume, the tank contents are discharged to the process sewer only one or two times a year.

2. **Maintenance and Storage Facility (MASF)**, the MASF consists of a main building and a two-story service wing, located within the 400 Area Protected Area. The purpose of this facility is to provide maintenance, repair, and storage facilities for radioactive or specialized maintenance equipment used in support of the Fast Flux Test Facility (FFTF). The MASF currently functions for its intended purposes.

MASF points of entry - the MASF contains 4 points of entry to the process sewer. One is routine and 3 are infrequent. The points of entry to the process sewer are not located in areas with the potential for radioactive contamination. All contaminated liquid waste, which does not discharge into the process sewer, is collected in radioactive liquid waste tanks and is not in contact with the process sewer effluent at any point. The radioactive liquid discharge collection system and the process water discharge are separate systems and are not connected. The routine contributor is the cooling water from the building service and instrument air compressor.

3. **481-A Water Pumphouse** - the Water Pumphouse is a concrete block building, on a concrete pad, which was constructed to provide space for a diesel fire pump and two sanitary water pumps. This building is also located within the 400 Area Protected Area. As shown in Figure 1, this facility is detached from the FFTF reactor containment and service building. No radioactive material is in this building.

481-A Water Pumphouse points of entry - the pumphouse contains 4 points of entry: one is routine and three are infrequent contributors. These points of entry are all related to the pumps housed in the facility. The three infrequent contributors (floor drains) are protected from contaminants by detailed maintenance procedures and administrative controls. The fourth floor drain, a frequent contributor because of weekly fire pump testing (an NFPA requirement) is protected from potential contamination since its inlet is installed above floor level. A 300 gallon fuel tank for the diesel fire pump is installed above floor level on a seismically qualified support (also an NFPA requirement). There is a very minor risk of the introduction of diesel fuel or equipment oil into the process sewer due to maintenance or an emergency in this building.

4. **The Fast Flux Test Facility (FFTF)** - the FFTF is a sodium cooled test reactor. The reactor's high neutron flux levels and energies have allowed accelerated testing of fuels and materials. The reactor has operated from 1980 until April 1, 1992, when it was ordered into standby (able to restart) status by the Department of Energy. The reactor will possibly be restarted in 1996 for Pu-238 production. The radioactive materials used in the facility would not significantly change for this new mission.

Eight cooling towers reject heat generated in equipment supporting the FFTF auxiliary systems, such as the heating, ventilation, and air conditioning (HVAC) systems. Adjacent to the cooling towers pad, a support building contains the water treatment equipment, water quality monitoring instrumentation, and the process controls for blowdown valves associated with the towers. This system is adjacent to the facility's reactor containment and service buildings within the 400 Area Protected Area. There is no contact between the process sewer and the cooling tower system and any radioactive wastes or nuclear materials in the facility.

The amount of waste process water discharged is expected to remain at current levels during standby and during possible restart. Since the cooling tower treatment procedures have not changed with the change in plant status, the effluent constituents would also remain unchanged. Minor changes in the process would occur if different treatment chemicals were ever approved for use.

FFTF points of entry - the cooling towers have 3 possible points of entry. All 3 are considered routine contributors to the process sewer effluent. They are 1) the equipment drain in the water treatment building which receives the effluent wastewater discharged by the Cooling Tower blowdown system, 2) the drain trench on the north side of the Cooling Tower pad which handles overflow or draining of the towers and precipitation runoff, and 3) the sink in the water treatment building which the operators use to wash their gloves, glassware, small equipment, hands, and similar items. In the water treatment building, the only chemicals that could be discharged into the sink are those already used to treat the cooling towers (no other chemicals are in the building).

C.2 4608 Percolation Ponds B and C Description

The 4608 Percolation Ponds B and C are engineered structures, located north-northeast of the 400 Area. The unlined ponds are 50x100 ft at the base, and are approximately 4 ft deep. The 400 Area Process Sewer empties into a diversion box built into the earthen wall dividing the two ponds. Manually operated slide gates located on either side of the diversion box determine the flow to the B or C pond. The ability to isolate either pond is provided to allow for maintenance, if required.

C.3 Stream Description

Table 1 identifies all the potential contributors (i.e., points of entry) to the 400 Area Process Sewer. Nine routine contributors represent greater than 99% of the total water volume currently discharged into the process sewer. The nine routine contributors are discussed below. They have been given item numbers in Table 2 for ease of reference.

Five of the routine contributors, which are items 1 through 5 on Table 2, are associated with the FMEF and FFTF Cooling Tower systems. The other four routine contributors, which are items 6 through 9 on Table 2, are associated with auxiliary facility equipment and cooling systems. The effluent stream has the basic characteristics of the 400 Area sanitary (potable) water supply. All of the 400 Area water is pumped from deep wells and chlorinated. The well water is also monitored by the Hanford Environmental Health Foundation (HEHF). The effluent wastestream divides into approximately 15% use from equipment and auxiliary systems cooling, and 85% from the two cooling tower systems.

The cooling tower systems at FMEF and FFTF have the same basic design and use the same treatment chemicals. Cooling towers at FFTF and FMEF represent the source of the majority of the water which is eventually discharged to the 400 Area Process Sewer, which may have been the reason for describing this discharge as "400 Area Secondary Cooling Water". The cooling tower operations at FMEF and FFTF differ in demand, but the basic design of the towers and the chemicals used at both facilities are the same. The cooling towers at both facilities are galvanized steel, closed loop evaporative cooling towers. The cooling systems for the facilities circulate a 40% ethylene glycol solution from the buildings through cooling coils in the cooling towers. Water is sprayed over coils as air is blown up through the cooling towers by fans. The evaporation of the spray water provides the cooling effect which is transferred through the cooling coils to the recirculated ethylene glycol solution. The three towers at FMEF and the eight towers at FFTF each have a sump capacity of approximately 2,000 gallons and periodically require draining for maintenance.

The chemical control systems have two objectives: to control biological growth within the tower and to protect the tower from the effects of scale formation.

The biological control is accomplished by use of two different chemicals, a biocide (Dearborn 702) and a microbicide (sodium hypochlorite). Biological growth within the cooling tower is controlled because detrimental biological species would thrive in a warm moist environment causing offensive odors or health risks to personnel and fouling of the cooling tower tubes with algae would inhibit heat transfer from the recirculated loop to the spray water.

The control is accomplished by adding the biocide (702) to the sump water on a regular basis to maintain a 25 ppm concentration in the towers. At FFTF the biocide (702) is continuously added by a metering pump into the makeup water provided to the towers. At FMEF, however, the biocide is added daily via metering pump into a recirculated stream of water from each cooling tower sump. The microbicide sodium hypochlorite addition to the towers at FMEF is done weekly to each operating tower by metering pump via the sump recirculation loop described above. At the FFTF, it is done manually to "shock" the tower only when maintenance requires personnel to physically enter the towers for cleaning (normally done during the spring and summer months). The microbicide sodium hypochlorite will have a concentration of 5 ppm for the shock treatment and 0.6-0.8 ppm if the normal 702 metering pump system is inoperative.

Scale formation protection is required due to increasing concentration of naturally occurring salts (typically calcium carbonate) resulting from the evaporation of the tower water. Primary protection is accomplished in both FMEF and FFTF by monitoring the electrical conductivity of the water in the sump. When the water conductivity approaches 1200 micromhos, automatic valving opens to discharge water. This conductivity is 3.5-4 times the average concentration of the incoming water, which corresponds to 2.5-3 cycles (uses) of the water through the cooling towers. Therefore, the concentration of nonvolatile constituents is expected to be at least 2.5 times that of the well water. Due to the discharge of water, the tower sump water level control system will initiate the addition of makeup water. The discharge of water continues until the conductivity of the sump water has fallen to approximately 900 micromhos due to the addition of fresh water.

A scale inhibitor, Dearborn 878, is added to the towers to maintain contentrations of 50-75 ppm in order to prevent the formation of scale. Scale inhibitor concentration control at FFTF is accomplished by metering the chemical into the makeup water at a rate of approximately 40 ppm. This concentration increases to the required range in the tower because of the evaporation of the water. At FMEF, the control is accomplished by metering the chemical directly into the tower when the conductivity control system opens the valve which blows down the sump water. As an independent operational check, a chemical analysis is performed in the field by the operator to ensure that the proper balance between addition to and discharges from the cooling towers is being maintained.

The chemical testing for scale inhibitor concentration involves the use of the following Dearborn Products:

Dearborn Code 595	Hydrochloric Acid Solution
Dearborn Code 904	Thorium Nitrate Solution
Dearborn Code 550	Sodium Thiosulfate/Borate Solution
Dearborn Code 562	Xylenol Orange Indicator
Dearborn Code 899	Beryllium Sulfate Solution

The resultant solution from the test (approximately 50 ml per test) is not designated a dangerous waste (WC02) since the beryllium concentration is .00095%, which is <.01% of the reportable concentration level. In conjunction with the washing of gloves, glass ware, equipment, hands, trace quantities of these products, along with the other cooling tower chemicals described above, are subject to disposal via the sinks located in both cooling tower buildings.

The procedures identified in this plan provide impartial verification of the 400 Area Process Sewer wastestream constituents. Past sampling, analysis, and process knowledge have indicated that the constituents in this wastestream are at innocuous levels. The Cooling Tower systems are the major contributors to the effluent stream and, as shown in the above discussion of chemical treatment, present the major potential for dangerous constituents in the wastestream. The average discharge amount for the Cooling Tower systems is shown in Table 2. The end-of-pipe discharge is not substantially diluted by the other contributing effluent. Historical information regarding the stream description and past sampling data can be found in "400 Area Secondary Cooling Water Stream-Specific Report" (WHC-EP-0342, Addendum 28).

The other potential points of entry are controlled by means of systems such as the FMEF Retention Liquid Waste System (RLWS). This system will be sampled twice the first year after the approval of this plan, using the protocol sampling procedures discussed in Sections E, F and G. The proposed analytes are shown on Table 3. These samples will establish a quality-controlled baseline of effluent constituents. After this baseline has been established, the system will be sampled using the analytes shown on Table 4. In all cases potential hazardous and dangerous materials are stored away from the points of entry and are controlled by administrative procedures. The majority of the points of entry are inactive.

Figure 1 provides a map of the 400 Area Process Sewer contributors, and the sewer main route to the 4608 Percolation Ponds. As discussed in the facility descriptions, the contributors to the process sewer are not cross-connected. The process water from each point of entry flows from its respective facility through an outgoing 6 inch pipe, which enters a 12 inch diameter pipe located in the approximate center of the 400 Area. This single outgoing pipe runs outside of the 400 Area Protected Area fence, and discharges to the one of the two Percolation Ponds. The effluent does not flow between facilities and becomes a single wastestream prior to discharge.

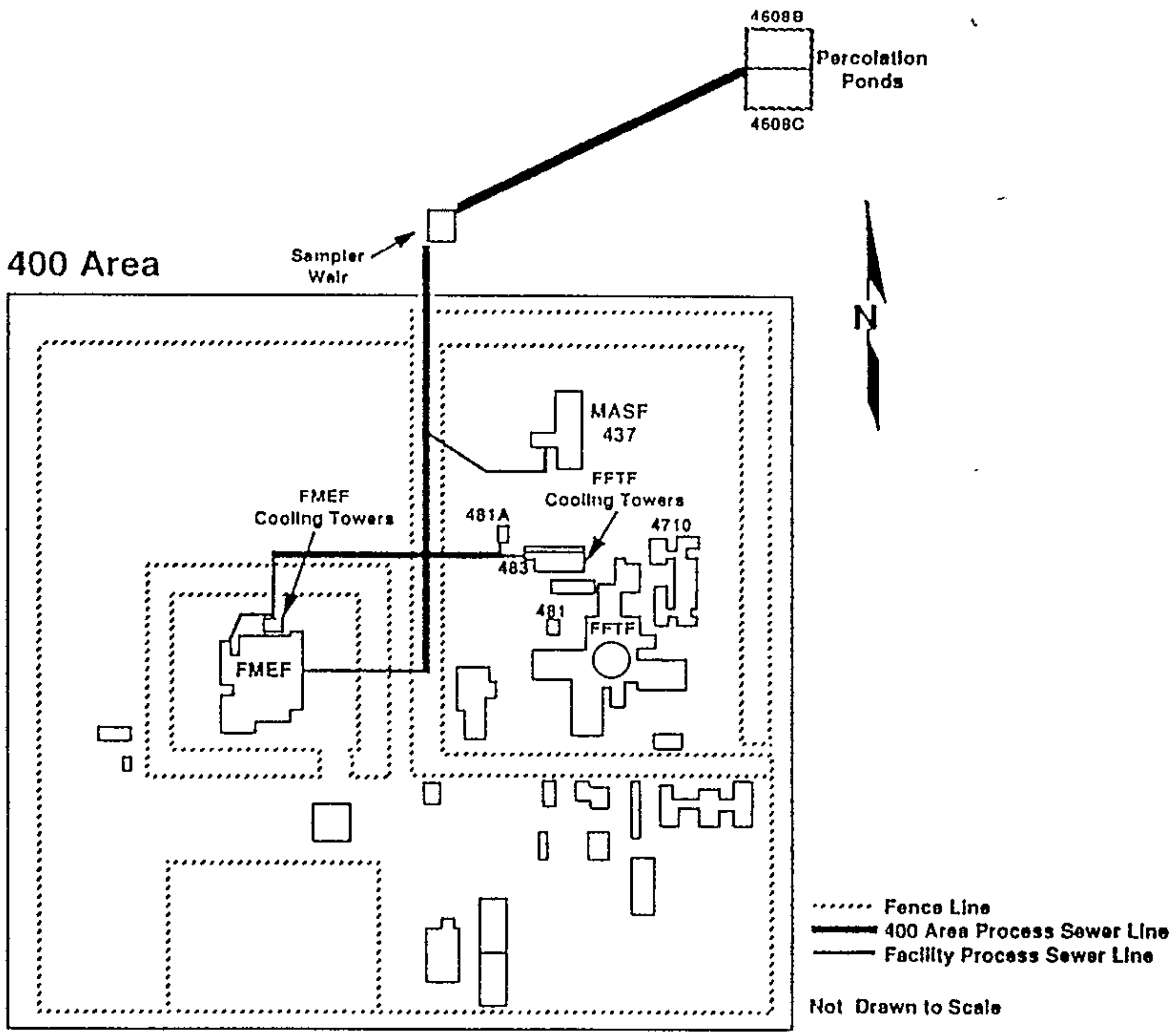

Figure 1. The 400 Area Process Sewer Map of Contributing Facilities and Effluent Discharge Route

Table 1. The 400 Area Process Sewer Total List of Contributors (Sheet 1 of 4)

Contributor				Type					
Item	Entry Type	Location	Room	Routine	Infrequent	Retention Liquid Waste System[a]	Source	Flow Range (gal/min)	Est. avg. (gal/min)
1	EWC	PB-FMEF	600		X	X	Personnel	--	--
2	EWC	PB-FMEF	608		X	X	Personnel	--	--
3	EWC	PB-FMEF	515		X	X	Personnel	--	--
4	EWC	PB-FMEF	409		X	X	Personnel	--	--
5	EWC	PB-FMEF	430		X	X	Personnel	--	--
6	EWC	PB-FMEF	117		X	X	Personnel	--	--
7	EWC	PB-FMEF	223		X	X	Personnel	--	--
8	EWC	FAA-FMEF	E105		X	X	Personnel	--	--
9	JS	PB-FMEF	504		X	X	Personnel	--	--
10	JS	PB-FMEF	408		X	X	Personnel	--	--
11	JS	PB-FMEF	309		X	X	Personnel	--	--
12	JS	PB-FMEF	149		X	X	Personnel	--	--
13	JS	FAA-FMEF	E278		X	X	Personnel	--	--
14	JS	CT-FMEF	N.yard	X			Personnel	<1	<1
15	FD	PB-FMEF	404		X	X	Process water/condensate	--	--
16	FD	PB-FMEF	238		X	X	Process water/condensate	--	--
17	FD	PB-FMEF	302		X	X	Process water/condensate	--	--
18	FD	PB-FMEF	307		X	X	Process water/condensate	--	--
19	FD	PB-FMEF	308		X	X	Process water/condensate	--	--
20	FD	PB-FMEF	313		X	X	Process water/condensate	--	--
21	FD	PB-FMEF	224		X	X	Process water/condensate	--	--
22	FD	PB-FMEF	213		X	X	Process water/condensate	--	--
23	FD	PB-FMEF	213		X	X	Process water/condensate	--	--
24	FD	PB-FMEF	204		X	X	Process water/condensate	--	--
25	FD	PB-FMEF	206		X	X	Process water/condensate	--	--
26	FD	PB-FMEF	321		X	X	Process water/condensate	--	--

Table 1 (continued)

Item	Contributor: Entry Type	Contributor: Location	Contributor: Room	Type: Routine	Type: Infrequent	Retention Liquid Waste System[a]	Source	Flow Range (gal/min)	Est. avg. (gal/min)
27	FD	PB-FMEF	209		X	X	Process water/condensate	--	--
28	FD	PB-FMEF	300		X		Equipment/Vehicles	--	--
29	FD	MEW-FMEF	352		X		Process water/condensate	--	--
30	FD	MEW-FMEF	352		X		Process water/condensate	--	--
31	FD	MEW-FMEF	352		X		Process water/condensate	--	--
32	FD	MEW-FMEF	352		X		Process water/condensate	--	--
33	FD	MEW-FMEF	352		X		Process water/condensate	--	--
34	FD	MEW-FMEF	352		X		Process water/condensate	--	--
35	FD	MEW-FMEF	352		X		Process water/condensate	--	--
36	FD	MEW-FMEF	352		X		Process water/condensate	--	--
37	FD	MEW-FMEF	352		X		Process water/condensate	--	--
38	FD	MEW-FMEF	352		X		Process water/condensate	--	--
39	FD	MEW-FMEF	352		X		Process water/condensate	--	--
40	FD	MEW-FMEF	352		X		Process water/condensate	--	--
41	FD	MEW-FMEF	352		X		Process water/condensate	--	--
42	FD	MEW-FMEF	352		X		Process water/condensate	--	--
43	FD	MEW-FMEF	352		X		Process water/condensate	--	--
44	FD	MEW-FMEF	352		X		Process water/condensate	--	--
45	FD	MEW-FMEF	352		X		Process water/condensate	--	--
46	FD	MEW-FMEF	352		X		Process water/condensate	--	--
47	FD	MEW-FMEF	352		X		Process water/condensate	--	--
48	FD	MEW-FMEF	352	X			Process water/pressure regulator	<1	<1
49	FD	EEW-FMEF	355		X		--	--	--

Table 1 (continued)

Item	Contributor: Entry Type	Contributor: Location	Room	Type: Routine	Type: Infrequent	Retention Liquid Waste System[a]	Source	Flow Range (gal/min)	Est. avg. (gal/min)
50	FD	EEW-FMEF	355		X		--	--	--
51	FD	FAA-FMEF	E104		X	X	--	--	--
52	FD	FAA-FMEF	E104		X	X	--	--	--
53	FD	FAA-FMEF	E104		X	X	--	--	--
54	FD	FAA-FMEF	E104		X	X	--	--	--
55	FD	FAA-FMEF	E300		X	X	--	--	--
56	FD	CT-FMEF	N.yard		X		Empty CT chemical drum wash	--	--
57	ED	PB-FMEF	204		X	X	--	--	--
58	ED	PB-FMEF	238		X		--	--	--
59	ED	EW-FMEF	E215	X			Computer room AC cooling	0-3	<1
60	ED	CT-FMEF	N.yard		X		--	--	--
61	ED	CT-FMEF	N.yard	X			CT drains	0-10[b]	4[b]
62	FD	HB-MASF	High Bay		X		Steam cleaner drain	--	--
63	FD	HB-MASF	High Bay		X		--	--	--
64	ED	ER-MASF	Equip. Rm	X			Air compressor cooling water	0-12	2[c]
65	FD	ER-MASF	Equip. Rm		X		--	--	--
66	FD	PH-481-A	--		X		--	--	--
67	ED	PH-481-A	--	X			Sanitary water pump	<1	<1
68	ED	PH-481-A	--		X		--	--	--
69	ED	PH-481-A	--		X		--	--	--
70	JS	CT-FFTF	611	X			Personnel	<1	<1
71	ED	CT-FFTF	611	X			CT blowdown	4-25[b]	10
72	ED	CT-FFTF	PAD	X			Overflow and drains	1-5	1
73	FD	PB-FMEF			X	X	Overflow from T-21 & 22	--	--
74	FD	PB-FMEF			X	X	Overflow from T-23 & 24	--	--

[a]Effluent wastewater collected and stored in FMEF retention liquid waste tanks. All sampling (future) before discharge to process sewer.

[b]Variance results from ambient conditions (FMEF Cooling Tower 0 flow for November through March).

[c]Facility support system intermittent operation.

Table 1 (continued)

AC	=	air conditioning
CT	=	cooling towers
CT-FFTF	=	FFTF cooling tower area on 483 pad
CT-FMEF	=	FMEF cooling towers area
ED	=	equipment drain
EEW-FMEF	=	427 Emergency Equipment Wing
ER-MASF	=	equipment room of 437 Building
EW-FMEF	=	4862 Entry Wing
EWC	=	electric water cooler (drinking fountain)
FAA-FMEF	=	4862 Fuel Assembly Area
FD	=	floor drain
HB-MASF	=	high-bay area of 437 Building
JS	=	Janitorial sink
MEW-FMEF	=	427 Mechanical Equipment Wing
PB-FMEF	=	427 Process Building
PH-481-A	=	481-A Pump House
RM	=	room

Table 2. The 400 Area Process Sewer List of Routine Contributors

Item #	Entry Point	Location Facility-Building/area	Source	Flow (gal/min) Range	Flow (gal/min) Average
1	Sink	FMEF/CT	Personnel	<1	<1
2	Equipment drain	FMEF/CT	Blowdown system, cooling spray water	0-10[ab]	<1[a]
3	Sink	FFTF/CT	Personnel	<1	<1
4	Equipment drain	FFTF/CT	Blowdown system cooling water	4-25[b]	10
5	Equipment drain	FFTF/CT	Drain trench cooling water	1-5	1
6	Floor drain	FMEF/MEW	Process water pressure regulator, relief drain	<1	<1
7	Equipment drain	FMEF/EW	Computer room air conditioning unit, cooling water	0-3	<1
8	Equipment drain	MASF/ER	Air compressor cooling water	0-12	2
9	Equipment drain	481-A Pump House	Sanitary water pump packing leakage	<1	<1
		Total flow	All sources	6-56	18

[a]Tower cooling water drained October through March.

[b]Variance because of ambient conditions.

ED = equipment drain

CT = cooling towers

FFTF = Fast Flux Test Facility

FMEF = Fuels and Materials Examination Facility

MASF = Maintenance and Storage Facility

MEW = Mechanical Equipment Wing

Table 3. The 400 Area Process Sewer Analytes of Interest for Protocol and Permitting Sampling

Candidate Parameters

pH	Sulfate
Conductivity	Fluoride
Total Dissolved Solids	Cadmium/7440-43-9
BOD (5 day)	Chromium/7440-49-3
COD	Lead/7439-92-1
Ammonia-N	Mercury/7439-97-6
TKN-N	Selenium/7782-49-2
Nitrate-N	Silver/7440-22-4
Ortho-phosphate-P	Copper/7440-50-8
Total-phosphate-P	Iron/7439-89-6
Total Oil & Grease	Manganese
Calcium/7440-23-5	Zinc/7440-66-6
Potassium/7440-09-7	Barium/7440-39-3
Chloride	Total Coliform

Table 4. The 400 Area Process Sewer Analytes of Interest Routine Effluent Sampling

Analyte	Maximum Contamination Level	
Arsenic	0.05	mg/l
Barium	1.00	mg/l
Cadmium	0.01	mg/l
Chromium	0.05	mg/l
Fluoride	2.00	mg/l
Lead	0.05	mg/l
Mercury	0.002	mg/l
Nitrate (as N)	10.00	mg/l
Selenium	0.01	mg/l
Silver	0.05	mg/l
Chloride	250.0	mg/l
Color	15.0	units
Copper	1.00	mg/l
Iron	0.30	mg/l
Manganese	0.05	mg/l
Sulfate	250.0	mg/l
Total Dissolved solids	500.0	mg/l
Zinc	5.0	mg/l

Specific conductivity	700.0 µmhos/cm
Foaming Agents	0.5 mg/l
Odor	3 Threshold odor number
Corrosivity	Non-corrosive
pH	6.5 - 8.5

Gross alpha particle activity (including radium-226, but excluding uranium)	15.0 pCi/l
Radium 226 and 228	5.0 pCi/l
Gross beta particle activity	4.0 mrem/year

D. RESPONSIBILITIES

The FFTF Regulatory Compliance group has prepared this Sampling and Analysis Plan, and is coordinating the preparation of updated procedures to support the facility sampling activities. In addition, Regulatory Compliance personnel will provide additional technical support to the sampling activities as necessary. The FFTF Regulatory Compliance Cognizant Engineer will act as the sampling task leader whose responsibilities include scheduling and initiating the sampling event, assuring appropriate and qualified personnel be available for sampling, and reviewing the data after analysis.

400 Area Operations Support Services (OSS) personnel support the routine stream sampling and monitoring of the waste stream flow data. The OSS operators are responsible for collecting a monthly composite sample. The operator is then responsible for delivering the sample to the manager of 400 Area Transportation Services, who will complete the appropriate transportation requests, and have the sample delivered to the Pacific Northwest Laboratories (PNL) for analysis. The OSS personnel are trained to written plant procedures for the operation of composite sampling equipment, the collection and radiological release of the sample, and transport to the laboratory. The sampling and laboratory analysis will require no additional surveillance to current procedures.

The protocol sampling will be conducted to meet the quality assurance criteria of EPA's SWP-846. Protocol sampling will be completed by the sampling team from the Sampling and Mobile Laboratories (S&ML). The S&ML personnel has special training in the security, preservation, and shipping of samples. The protocol sampling will be coordinated by the Effluent Treatment Program Office and FFTF Regulatory Compliance personnel.

The personnel taking the routine composite sample will make a written record of sampling as required by the procedure. The data will include the sampler's name, the date and time of the sample, and location. Originals of the written record will be submitted to 400 Area FFTF Regulatory Compliance personnel and 400 Area OSS.

The chain of custody for both protocol and monthly composite sample packages will be maintained by the original sampler, or a member of the sampling team to the laboratory or point of shipping. Completed chain of custody forms for protocol samples will be held by OSM or qualified FFTF Regulatory Compliance personnel. Completed chain of custody forms for monthly composite samples will be retained by 400 Area FFTF Regulatory Compliance personnel and 400 Area OSS.

The Effluent Treatment Program Office is responsible for the selection of a laboratory to perform the needed analyses. This laboratory must meet the criteria of this Sample and Analysis Plan, and the QAPP.

Data validation for protocol samples will be performed by qualified personnel, selected by the Effluent Treatment Program Office. The validation process will calculate the accuracy, precision, and completeness of the data. The personnel completing the data validation will forward the data to FFTF Regulatory Compliance, who will be responsible for preparing the data for appropriate release.

FFTF Regulatory Compliance will prepare a data file of the monthly composite samples. This data file will be maintained in their office and it will be this group's responsibility to maintain the quality of the records. The data in the file will include sampling logs, process flow records, analytical results, and calculations.

When monitoring and/or analysis indicate that the effluent is out of compliance with established parameters, these deficiencies must be addressed using appropriate corrective actions. Two levels of deficiency may exist with the process sewer effluent. The constituents can 1) exceed the maximum operating limits, but be under regulatory release threshold limits or 2) exceed both the maximum operating limits and the regulatory release limits. In the first case, the deficiency will be documented and tracked by taking additional samples and performing a trend analysis. In the second case, the deficiency will be documented and tracked through the Occurrence Reporting System, per DOE Order 5000.3A, "Occurrence Reporting and Processing of Operations Information." The Manager, FFTF Regulatory Compliance will be responsible for these corrective actions.

E. SAMPLING LOCATION AND FREQUENCY

E.1 Sampling Location

Routine sampling activities include composite effluent sampling and continuous pH, flowrate, and conductivity measurements at the North Environmental Monitoring Station (see Sampler Weir on Figure 1). A composite sample is drawn and analyzed monthly. Continuous (circle chart) pH, flowrate, and conductivity measurements are collected weekly. The sampling location provides a representation of the total contribution to the 400 Area Process Sewer. The analytes of interest for the monthly composite sample are specified in Table 4.

Protocol samples will be taken at the end-of-pipe location were the effluent is discharged into the Percolation Ponds. This location is the most downstream position where a sample may be taken. As discussed in the stream description (Section C.3), this will accurately represent all wastewater constituents in the waste stream. Protocol sampling will also be conducted at the Retention Liquid Waste System in FMEF. The proposed protocol sample analytes are shown in Table 3.

E.2 Frequency

Monthly composite samples will be taken from the process sewer sampler. This monthly composite sample will comply with the written facility operating procedures. These procedures specify the appropriate procedure for operating the equipment, using a clean, polyurethene sample bottle from the 400 Area Operations Services, collecting representative effluent, and appropriate transportation to the laboratory.

Protocol samples at the end-of-pipe and at the RLWS will be taken twice initially to establish a baseline. After a characterization baseline is established, protocol samples will be taken annually. In addition, further sampling events may be conducted in accordance with future permitting requirements, or for additional verification of constituent analysis. These will be conducted by the same responsible personnel as in protocol sampling activities. As described below, quality control samples such as field duplicate blanks will be taken during each protocol sampling event. The number of these samples will be a full set, or a lesser number if the qualified sampling team members evaluate this to be appropriate and of equal quality to the full set. Protocol sampling will be initiated within three months after approval of this plan.

Field duplicate samples, field blanks, trip blanks and equipment blanks will be taken during each non-routine sampling event. Field duplicate samples as defined in the QAPP are samples taken at approximately the same time, and under identical conditions and preparation, to verify the repeatability of the laboratory data. A sample of 400 Area sanitary water supply will also be taken during each sampling event and analyzed for the same set of analytes as shown in Table 3.

Monitoring for the flowrate, pH, and conductivity of the effluent is done on a continuous basis. It will be monitored by the protocol sampling team, in addition to temperature, when those sampling activities are conducted. The sampling team is also trained to make the appropriate environmental observations in log books, and used the prescribed control samples to assure a quality data record of the sampling environment.

F. SAMPLE DESIGNATION

For monthly composite samples, the sample is transferred by the operator from the sampler receiving bottle into a clean, labeled one (1) liter bottle. The label information, as specified in the composite sampler operating procedure, includes the date, time, location, and name of operator who took the sample. The operator then delivers it to the Supervisor, FFTF Transportation Services for delivery to the Environmental Protection Laboratory, 325 Building, 300 Area. The analytes of interest in routine sampling are to be in compliance with WAC 248-54-175, "Maximum Contaminant Levels," 40 CFR 141, "National Primary Drinking Water Regulations," and 40 CFR 143, "National Secondary Drinking Water Standards". These analytes are shown in Table 4.

The procedures for protocol sample designation are being developed by the Sampling and Mobile Laboratories. These procedures will be in compliance with appropriate regulatory and company methods. The facility-specific procedure for the 400 Area Process Sewer will be similar in format and content to "Procedure for Collecting RCRA/CERCLA Samples From UO_3 Liquid Effluent Stream" (WHC, LO-080-431A.0). The samples will use Hanford Environmental Information System (HEIS) sample numbers, verified with HEIS management, and the data will be verified accordingly. The analytes of interest for protocol samples, which are shown in Table 3, are chosen in accordance with the QAPP and with 40 CFR 136, "Guidelines Establishing Test Procedures for the Analysis of Pollutants".

G. SAMPLING EQUIPMENT AND PROCEDURES

G.1 Routine Monitoring

The routine monitoring of discharges to the 4608 B and C Percolation Ponds is performed in the North Environmental Monitoring Station located north of the 400 Area. As discussed in the stream description above, this location is the representative point to obtain a typical sample of the total facility effluent stream. The characteristics for which the effluent is continuously monitored include pH, flowrate, and conductivity. Where applicable, preventative maintenance and calibration procedures are used to maintain the sampling and monitoring equipment.

The analysis performed on the monthly composite wastewater samples will be for the analytes shown in Table 4. A Hanford based laboratory, such as PNL, will perform the analysis using current approved procedures and Quality Assurance requirements. The data sheets and analytical results from the onsite laboratory will be transmitted to and maintained by 400 Area OSS and FFTF Regulatory Compliance.

Data and record information that has been validated will be transmitted to the Environmental Data Management Center (EMDC), or to the HEIS data file when it becomes available.

G.2 Protocol Samples

The procedures for protocol sample designation are being developed by the Sampling and Mobile Laboratories. These procedures will be in compliance with appropriate regulatory and company methods. The facility-specific procedure for the 400 Area Process Sewer will be similar in format and content to "Procedure for Collecting RCRA/CERCLA Samples From UO_3 Liquid Effluent Stream" (WHC, LO-080-431A.0). The samples will use Hanford Environmental Information System (HEIS) sample numbers, verified with HEIS management, and the data will be verified accordingly.

H. SAMPLE HANDLING AND ANALYSIS

The various types of samples discussed in this plan will be analyzed for the parameters shown on Table 5.

Table 5. The 400 Area Process Sewer Analyses to be Conducted on Samples

Sample Type	Parameters
Routine	All of Table 4
Protocol	All of Table 3
Well Water	All of Table 3
Duplicate	All of Table 3
Field Blanks	Volatile Organics
Trip Blanks	Volatile Organics

H.1 Routine Monitoring

For monthly composite samples, the sample is labeled with information, as specified by QAPP. The operator delivers it to the Supervisor, FFTF Transportation Services for delivery to the Environmental Protection Laboratory, 325 Building, 300 Area.

H.2 Protocol Sampling

The procedures for protocol sample designation are being developed by the Sampling and Mobile Laboratories. These procedures will be in compliance with appropriate regulatory and company methods. The facility-specific procedure for the 400 Area Process Sewer will be similar in format and content to "Procedure for Collecting RCRA/CERCLA Samples From UO_3 Liquid Effluent Stream" (WHC, LO-080-431A.0). The samples will use Hanford Environmental Information System (HEIS) sample numbers, verified with HEIS management, and the data will be verified accordingly. The activities addressed will include the physical custody and chain-of-custody forms for the samples, field test procedures, field notes, sample collection, preparation of equipment for sampling activities, and sample documentation maintenance.

I. REFERENCES

DOE, 1990, *Occurrence Reporting and Processing of Operations Information*, Order 5000.3A, U. S. Department of Energy, Washington, D. C.

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WHC, 1992, *Procedure for Collecting RCRA/CERCLA Samples From UO_3 Liquid Effluent Stream*, LO-080-431A, Westinghouse Hanford Company, Richland, Wa.

WHC, 1989, *400 Area Secondary Cooling Water Stream-Specific Report*, WHC-EP-0342, Addendum 28, Westinghouse Hanford Company, Richland, Wa.

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